Installation instructions

Solar panels on-roof installation

Installation instructions
Solar panels on-roof installation

English

EKSV26P
EKSH26P

Contents

1 Safety

1.1 Observing Instructions

This manual is intended for authorised and trained technicians who have experience with the proper installation and commissioning of heating systems on account of their technical training and knowledge.

All procedures required for installation, start-up, operation and adjustment of the installation are described in this instruction manual and associated instruction manuals. Please read this manual carefully and thoroughly before proceeding with the installation and initial start-up or modification of the system.

Relevant documents

Documents listed below are part of the technical documentation of the solar system and must also be observed. The documents are included in the scope of supply of the individual components.

For configuration with the air-water heat pump EKHBH*/EKHBX* (pressurized system +p):
- Control and pump unit for solar systems (pressurized system) EKSR3PA/EKSRDS1A.
- Solar add-on for air-water heat pump system KKSOLHWAV1.
- Process water for air-water heat pump EKHWE*/EKHWS*.

For configuration with the air-water heat pump EKHBRD*(unpressurized system p=0):
- Control and pump unit for solar systems (unpressurized system) EKSRPS3.
- Hot water storage tank for air-water heat pumps EKHWP300/500A.

1.2 Warning signs and explanation of symbols

Meaning of the warnings

Warnings in this manual are classified according into their severity and probability of occurrence.

DANGER!

Draws attention to imminent danger.

Disregarding this warning can lead to serious injury or death.

WARNING!

Indicates a potentially dangerous situation.

Disregarding this warning can result in serious injury or death.

CAUTION!

Indicates a situation which may cause possible damage.

Disregarding this warning can lead to damage to property and the environment.

This symbol identifies user tips and particularly useful information, but not warnings or hazards.

Special warning signs

Some types of danger are represented by special symbols:

Electrical current

Danger of burning or scalding

Validity

This instructions are especially for the on-roof installation of the solar panel array, for routing the piping and for start-up.
For other types of installation (in-roof, flat roof mounting) the instructions for the individual type of installation are applicable.

The operating and installation instructions of the respective control and pump unit are to be observed when installing piping and starting up, .

p=0 Only applicable for the unpressurized system (Drain Back)  Only applicable for the pressurized system

Handling instructions

- Instructions on actions are shown as a list. Actions of which the sequential order must be maintained are numbered.
  ➔ Results of actions are identified with an arrow.

1.3 Avoid danger

DAIKIN solar systems are state-of-the-art and are built to meet all recognised technical requirements. However, improper use can lead to serious injuries or death, as well as cause material damage. To avoid any danger, only install and operate DAIKIN solar systems:

– as stipulated and in perfect condition,
– with an awareness of the safety and hazards involved.

This assumes knowledge and use of the contents of this manual, the relevant accident prevention regulations and the recognised safety-related and occupational medical rules.

1.4 Proper use

The solar system may only be used for generating hot water and for solar-supported heating of hot water systems. The solar system must be installed, connected and operated only according to the instructions in this manual.

Any other use outside the above-mentioned use is considered as improper. Any resulting damages will be borne by the user/owner alone.

Proper use also includes observing the relevant maintenance and servicing conditions. Spare parts must at least satisfy the technical requirements defined by the manufacturer. This is the case, for example, with original spare parts.

1.5 Instructions for operating safety

Working on the roof

- Installation work on the roof may only be carried out by authorised and trained persons (heating technicians, roofers, etc.) in compliance with the relevant Accident Prevention Regulations and with the use of suitable personal protection equipment.
- Material and tools must be secured from falling down.
- Barriers must be erected to prevent persons from entering the area below the roof where the work is being carried out.

Before working on the heating system

- All work on the heating system (such as installation, connection, and commissioning) may only be carried out by authorised and trained heating technicians.
- Switch off the mains supply before starting any work on the heating system and secure it against unintentional switch-on.

Electrical installation

- Electrical installations may only be carried out by qualified electrical technicians under observance of the relevant electrical guidelines and the regulations of the electric utilities company.
- Before connecting to the mains supply, check that the voltage specified on the type label of the heating system (230 V, 50 Hz) is the same as the available supply voltage.

Instructing the user/owner

- Before you hand over the heating system, explain to the user/owner how to operate and check the heating system.

2 Product description

p=0 The unpressurized system (Drain Back) can only be operated with the air-water heat pump EKHBRD*, the pump unit EKSRPS3 and the hot water storage tank EKHWP*.

+p The pressurized system can only be operated with the heat pump EKHBH* or EKHBX*, the pump unit EKSRDS1A, the control unit EKSR3PA, the solar connection set EKSOL and the hot water storage tanks EKHWE/EKHWS.

Depending on the system, the following components are required. Unless specified otherwise, the components are not included in the scope of delivery and need to be ordered separately.

2.1 System components for all systems +p p=0

High performance flat solar panels

Solar panel EKSV26P
– H x W x T: 2000 x 1300 x 85 mm, weight: approx. 42 kg

Solar panel EKSH26P
– H x W x T: 1300 x 2000 x 85 mm, weight: approx. 42 kg

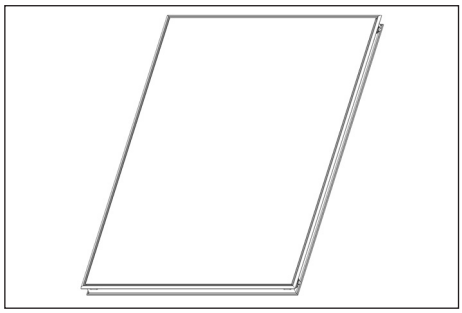


Fig. 2-1 Flat solar panel (EKSV26P)

Solar panel installation rails EKSFIXMP

EKSFIXMP130
– for a EKSV26P solar panel

EKSFIXMP200
– for a EKSH26P solar panel

Consists of:
– 2 mounting profile rails
– 2 solar panel securing hooks

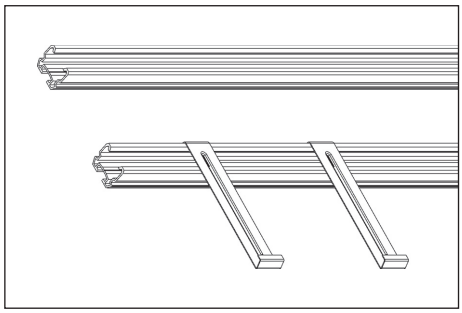


Fig. 2-2 EKSFIXMP

Kit for installing a solar panel on a roof

EKSFIXAD
Consists of:
– 4x roof ties
– 8x woodscrews (Ø 8 x 60 mm)

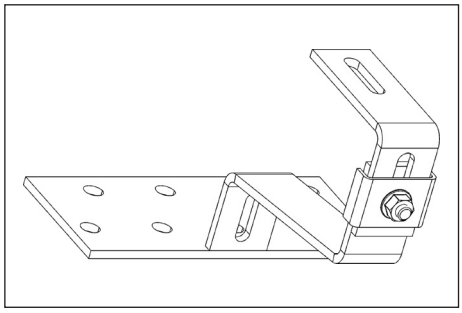


Fig. 2-3 EKSFIXAD

EKSFIXADP

Consists of:

– 4x roof ties (double height adjustment)
– 8x woodscrews (Ø 8 x 60 mm)

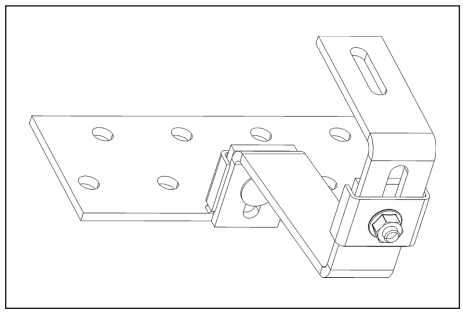


Fig. 2-4 EKSFIXADP

EKSFIXADS

Consists of:

– 4x roof ties for flat roofing (e. g. slate)

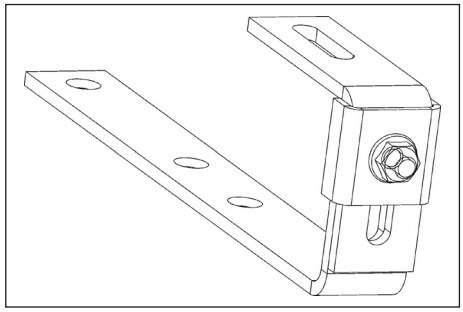


Fig. 2-5 EKSFIXADS

EKSFIXWD

Consists of:

– 4x hanger bolt for corrugated roofing

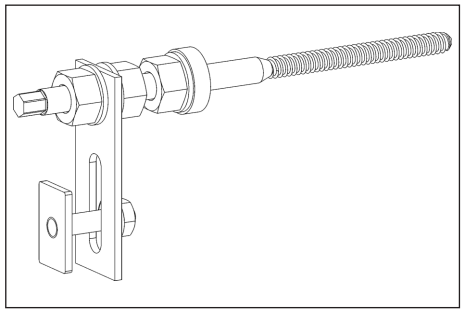


Fig. 2-6 EKSFIXWD

EKSFIXBD

Consists of:

– 4x holders for welted sheet metal roofing

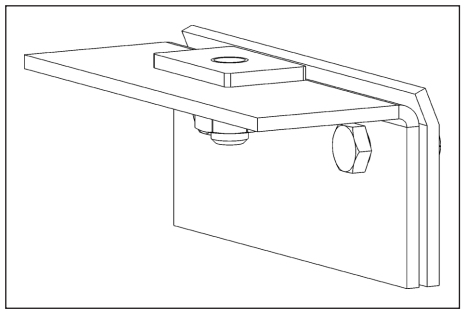


Fig. 2-7 EKSFIXBD

Solar panel connection

EKSFIXVBP

Consists of:

– 1x mounting profile connector
– 2x expansion joints for solar panel connection with mounting support
– 2x double clamping blocks for solar panel fixing

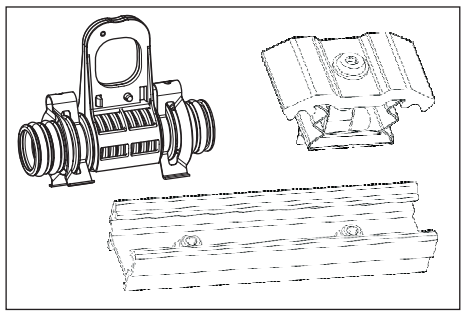


Fig. 2-8 EKSFIXVBP

2.2 System components for the pressurized system +p

Solar panel connection set

EKSRCP

Consists of:

– Assembly material for solar panel and connection pipe (4x individual clamping blocks, 1 x equipotential bonding terminal, pipe clamps),
– UV-resistant heat insulation for external area (2 m),
– Connection fittings (compression ring fittings to connect a connecting pipe (Cu Ø22 mm))
– Solar panel temperature sensor

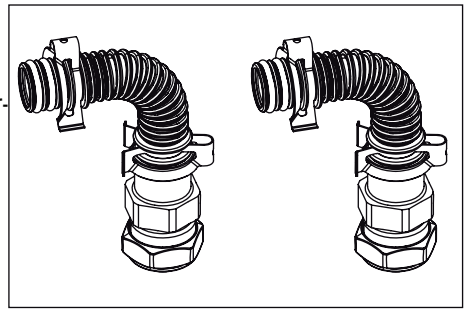


Fig. 2-9 EKSRCP

Solar panel serial connector

EKSCONLCP

For connecting two rows of solar panels one above the other.
Consists of:

– 4x individual clamping block
– 2x equipotential bonding terminal
– 2x end cap
– 2x Solar panel connection elbow with compression ring fittings to connect a connecting pipe (Cu Ø22 mm)

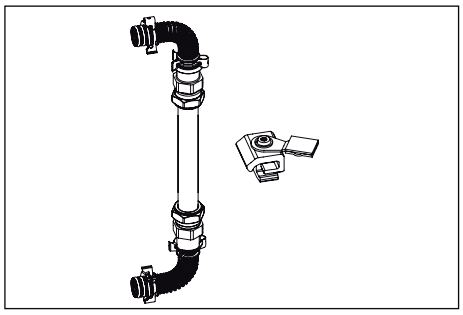


Fig. 2-10 EKSCONLCP

Solar liquid

EKSGFL

20 Litres of ready-mix with frost protection up to -28 °C

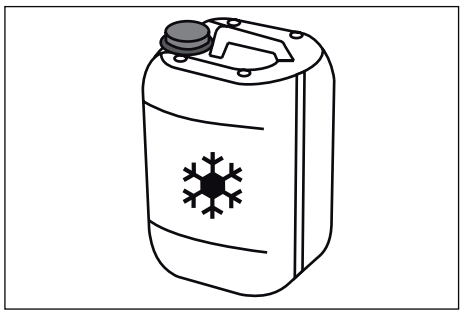


Fig. 2-11 EKSGFL

2.3 System components for the unpressurized system p=0

Roof penetration kits on-roof mounting

EKSRCAP (anthracite) and EKSRCRP (tile red)
Consists of:

– Roof penetration on-roof mounting in anthracite or tile red,
– Assembly material for solar panel and connection pipe (4x individual clamping blocks, 1 x equipotential bonding terminal, pipe clamps),
– UV-resistant heat insulation for external area (2 m),
– Connecting fittings (including release tool),
– Solar panel temperature sensor

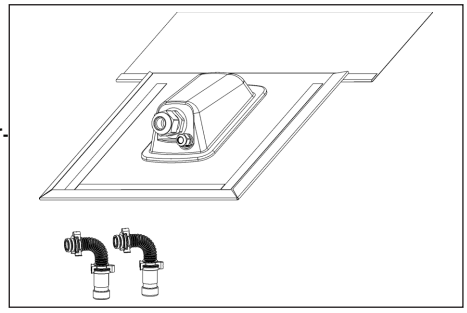


Fig. 2-12 EKSRCAP, EKSRCRP

Connection pipes EKSCON

EKSCON15, L=15 m
and
EKSCON20, L=20 m
Connection pipes between solar panel array and EKSRPS3 (thermally insulated feed and return line (Al-PEX compound pipe) with integrated sensor cable).

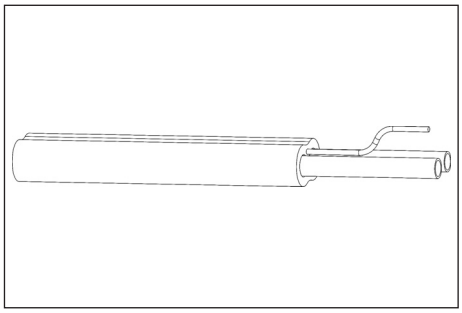


Fig. 2-13 EKSCON15 / EKSCON20

Extension kits for connection pipe EKSCONX

EKSCONX25, L=2.5 m
EKSCONX50, L=5 m
EKSCONX100, L=10 m
Heat insulated feed and return line with integrated sensor cable, pipe clamps and connecting fittings.

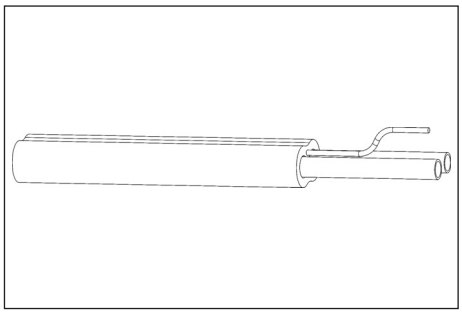


Fig. 2-14 EKSCONX

Extension kit for feed line EKSCONXV

EKSCONXV80, L=8 m
UV-resistant thermally insulated feed line with integrated sensor cable, pipe clamps, cable connection fitting and connecting fitting.

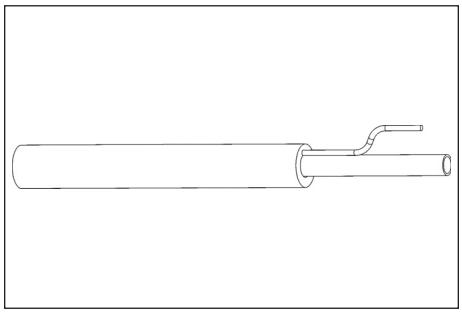


Fig. 2-15 EKSCONXV

Solar panel serial connector

EKSCONRVP
For connecting two rows of solar panels one above the other.

Consists of:
- 4x individual clamping block
- 2x equipotential bonding terminal
- 2x end cap
- 2x solar panel connection elbow
- 1 m thermally insulated Al-PEX compound pipe

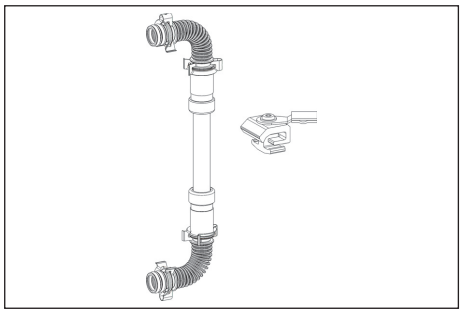


Fig. 2-16 EKSCONRVP

3 Installation

3.1 Transport and storage

3.1.1 Transport

CAUTION!

The EKSV26P/EKSH26P flat solar panels are impervious to slight mechanical loading. However, impact, shock and walking on them should be avoided.

- The EKSV26P/EKSH26P flat solar panels should be transported and stored carefully in their original packing only and this packing should not be removed until shortly before installation.
- The EKSV26P/EKSH26P flat solar panels should be stored and transported flat on even and dry supports.
  - Transport with forklift trucks or cranes is only allowed if on pallets.
  - Up to 10 flat solar panels can be stacked and transported on top of each other.

The EKSV26P/EKSH26P flat solar panels are delivered wrapped in film. As long as the solar panels are secured on a pallet which corresponds to the size of the solar panel, then industrial trucks such as forklift trucks and stackers or cranes are suitable for transport. Other components of the solar system are supplied packaged separately.

3.1.2 Storage

The following should be taken into account when storing solar system components:

- All components should be stored in dry and frost-protected rooms only.
- Dismantled hydraulic components must be completely drained before being stored.
- Components must not be stored until they have cooled down.
- Current-carrying components must be permanently isolated from the power supply before storage (switch off fuses and main switches, remove cables) and must be secured against inadvertent restarting.
- The components must be stored in such a way that persons are not endangered by them.

The regulations in the respective documentation for other heating components apply for transport and storage of these products.

3.2 System concepts

Solar systems are usually set up according to one of the following system layouts. This also includes the possibility of connection on the opposite side of the flat solar panels in each case.

Connection at opposite ends possible[1)] (possible from 1+ solar panels)

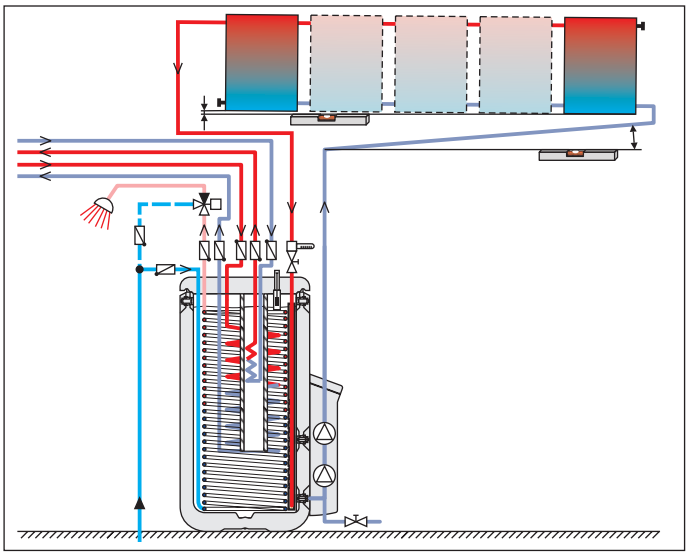


Fig. 3-1 Solar panel array connected at opposite ends with hot water storage tank EKHWP ([1)]type of connection recommended by DAIKIN)*

Same-side installation connection (up to maximum of 3 solar panels)

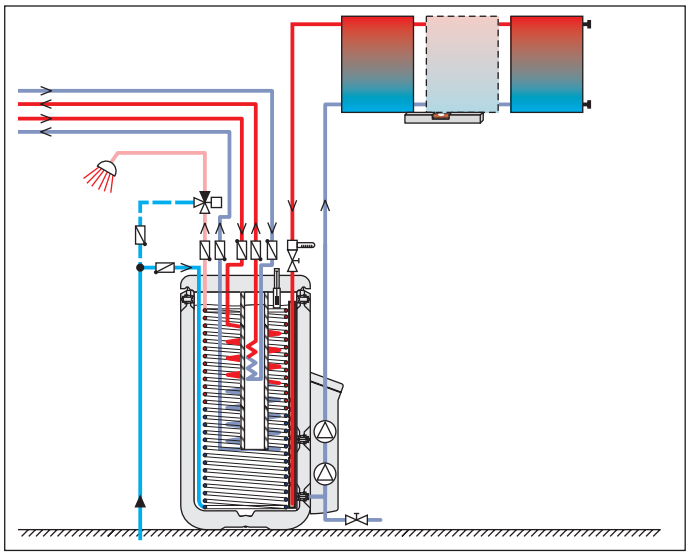


*Fig. 3-2 Same-side connected solar panel array with hot water storage tank EKHWP**

The EKSV26P/EKSH26P flat solar panels can be installed on flat roofs. Further information can be found in the installation instructions for the solar panel flat roof support frame.

The flat solar panel EKSV26P can be integrated into the roof surface. You will find further information in the solar panel in-roof installation instructions.

Installation instructions concerning differences between unpressurized and pressurized system

Unpressurized system (Drain Back) p=0	Pressurized system +p
With **solar panels** connected at opposite ends, the whole solar panel array **must be set up with at least 0.5 % gradient** to the lower panel connection (return flow). With a **same side panel connection** (max. of up to 3 solar panels allowed) the panels must be aligned with their lower edge **precisely horizontal**. The connection pipe must be set up with a continuous gradient of at least 2 % and without any counter gradient.	**No** particular **minimum gradient of the solar panel array** is required. A gradient from the lower (return flow) connection should however be avoided. The connection pipe between the solar panel array and the hot water storage tank must be made of pressure-resistant metal piping (recommended Cu Ø 22 mm). Using plastic piping is not allowed.

Tab. 3-1 Installation instructions

3.3 Laying connection pipes

3.3.1 Unpressurized System p=0

CAUTION!

Siphon action may never be allowed to occur anywhere in the pipe run between storage cylinder and the flat solar panel. This could lead to functional faults and even material damage.

- Always make sure that pipe runs have a continuous gradient of at least 2 %.

CAUTION!

In the case of longer pipe runs with only a minimum gradient, it is possible for water pockets to develop due to thermal expansion of the plastic pipes between the mounting points with siphon action:

- The pipes should either be fixed to a rigid auxiliary structure (e.g. a profile rail, pipe etc.) or the pipe should be run alongside a drainage pipe having a gradient (e.g. HT pipe).

- Lay prefabricated connection pipes (feed and return flow) with integrated sensor cable (see Chapter 2 "Product description") between the planned installation site of the solar panel array in the inner roof and the installation site of the hot water storage tank with the EKSRPS3 pump unit.
  - Make sure there is adequate length for connection to the hot water storage tank and the flat solar panels.
  - The maximum permissible overall pipe length must not be exceeded (see Tab. 3-2).

Number of solar panels	Max. possible total length of pipe
2	45 m
3	30 m
4	17 m
5	15 m

Tab. 3-2 Maximum lengths of the DAIKIN connection pipes

If larger distances need to be covered, calculations need to be made for the dimensioning of the connecting pipes.

Contact DAIKIN Service.

Additional notes about connecting pipes

If on-site conditions make it impossible or very difficult to install the connecting pipes in the manner described above, slight deviations from the specified installation are permitted. Hereby, the inflow pipe may not be larger than 18 x 1 mm.

1. If vertical copper pipes are already installed in the house, they can be used if a continuous connection pipe gradient can be guaranteed.
2. If a uniform gradient from the second roof penetration to all pipe sections can not be guaranteed when the solar panels are connected at opposite ends, then for roof penetration purposes, the inflow pipe can be connected to the top of (e.g. through a ventilating tile), if:
   - the highest point if the inflow pipe is not more than 12 m above the storage cylinder mounting floor level,
   - the internal diameter of the inflow pipe is not more than 13 mm,.
   - a continuous rise of the inflow pipe to the highest point, as well as a continuous gradient to the storage cylinder is ensured.
3. For pipe runs in which only a limited gradient can be achieved, copper pipe should be used on site. This avoids the need for a rigid supporting structure, and prevents the formation of water pockets due to expansion of the plastic pipes.

3.3.2 Pressurized system 

The connection pipe between the solar panel array and the hot water storage tank must be made of pressure-resistant metal piping (recommended Cu Ø 22 mm). Using plastic piping is not allowed.

For the roof penetration DAIKIN recommends laying the connection pipes through ventilation tiles to the inside of the roof.

3.4 Installing the solar panel components

DANGER!

There is an increased accident risk during work on a roof.

- Installation work on the roof may only be carried out by authorised and trained persons (heating technicians, roofers, etc.) in compliance with the relevant Accident Prevention Regulations and with the use of suitable personal protection equipment.
- Material and tools must be secured against falling down.
- Barriers must be erected to prevent persons from entering the area below the roof where the work is being carried out.
- Before starting the installation work, check that the roof structure has adequate carrying capacity and is undamaged. (e.g. defective laths or leaks in the roof.).

WARNING!

After their packaging is removed, the flat solar panels will become hot very quickly if they are exposed to the sun's rays.

- Wear protective gloves.
- Remove protective caps (not heat-resistant) after positioning the flat solar panel.
- Do not remove the protective covering of the glass on the solar panel until leak testing has been completed.

CAUTION!

p=0

Frost or overheating can damage the system.

- Permit the system to drain. Make sure that the flat solar panels are installed so that their lower edge is always higher than the inflow coupling of the Solaris storage cylinder.

Unless specified otherwise, the installation steps quoted for tiled roofs are the same for other roof coverings.

Notes for safe and trouble-free operation p=0

- Mount the solar panel array with a gradient to the lower collector coupling (return flow).
- For flat solar panel arrays with connections on same side (up to 3 solar panels permitted), the lower edges of all the solar panels must be absolutely horizontal. However, we recommend always making the connections at opposite ends.
- Always run the connection pipe between the flat solar panels and the storage with continuous gap to avoid a siphon effect (two-way gap) over the whole connection passage.
- The upper edge of the flat solar panels may not be more than 12 m above the storage cylinder(s) mounting floor level.

3.4.1 Installing the supporting structure for subsequent installation on the roof

DANGER:

Non-intended use and prohibited modifications to the structure reduce safety. Any change to the structure of components is not permitted.

Installation kits for on-roof installation, we offer the roof bracket EKSFIXAD and EKSFIXADP for roof tiles, for slate roofs the roof bracket EKSFIXADS, for corrugated roof coverings the roof bracket EKSFIXWD and for welted sheet metal coverings the roof bracket EKSFIXBD.

Main dimensions of solar panel array for on-roof mounting

Number of solar panels			1	2	3	4	5
Measuring point		Dim.	Dimensions in mm				
Solar panel array width (length mounting profile rail)	EKSV26P	B	1332	2664	3996	5328	6660
	EKSH26P		2032	4064	6096	8128	10160
Distance from roof breakthrough		H_0	300 to 700				
Height of solar panel array	EKSV26P	H_1	2000				
	EKSH26P		1300				
Distance from bottom edge of solar panel to lower mounting profile rail		Y_0	200				
Spacing of the mounting rails	EKSV26P	Y_1	1400 to 1600				
	EKSH26P		800 to 1000				
Distance from lower solar panel edge to lower edge of the perforated plate of roof mounting bracket		Y_2	235 to 270				
Max. distance from edge of solar panel array to the first roof mounting bracket		X_0	400				
Spacing of the roof mounting brackets of a flat solar panel	EKSV26P	X_1	500 to 1100				
	EKSH26P		1000 to 1800				
Spacing of roof mounting brackets between two flat solar panels		X2	230 to 630				
Distance between solar panel array and the first solar panel securing clip		A_0	120 to 220				
Spacing of the roof mounting brackets of a flat solar panel	EKSV26P	A_1	900 to 1100				
	EKSH26P		1600 to 1800				
Spacing of solar panel mounting brackets between two flat solar panels		A_2	240 to 440				
Distance of edge of solar panel to hydraulic connection		E_0	approx. 73				
Centre-to-centre distance of the solar panel couplings	EKSV26P	E_1	1854				
	EKSH26P		1154				
Distance from top edge of solar panel to connection of solar panel sensor		F	172				

Tab. 3-3 Main dimensions of a solar panel array for on-roof mounting

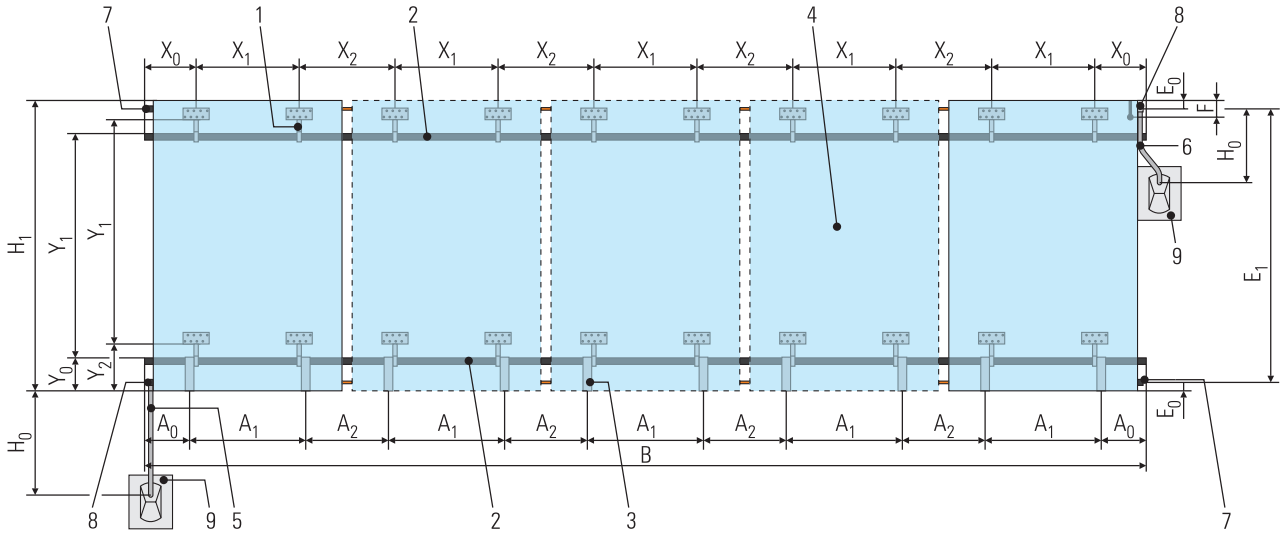


Fig. 3-3 Main dimensions of a solar panel array for on-roof mounting (example shows solar panel EKSV26P)

1 *Roof mounting bracket*
2 *Mounting rail*
3 *Solar panel securing clip*
4 *Flat solar panel EKSV26P*
5 *Return flow connection*
6 *Flow connection*
7 *Solar panel sealing plug*
8 *Solar panel connection elbow*
9 *Universal roof penetration*
Roof penetration exists on site (ventilation tiles)

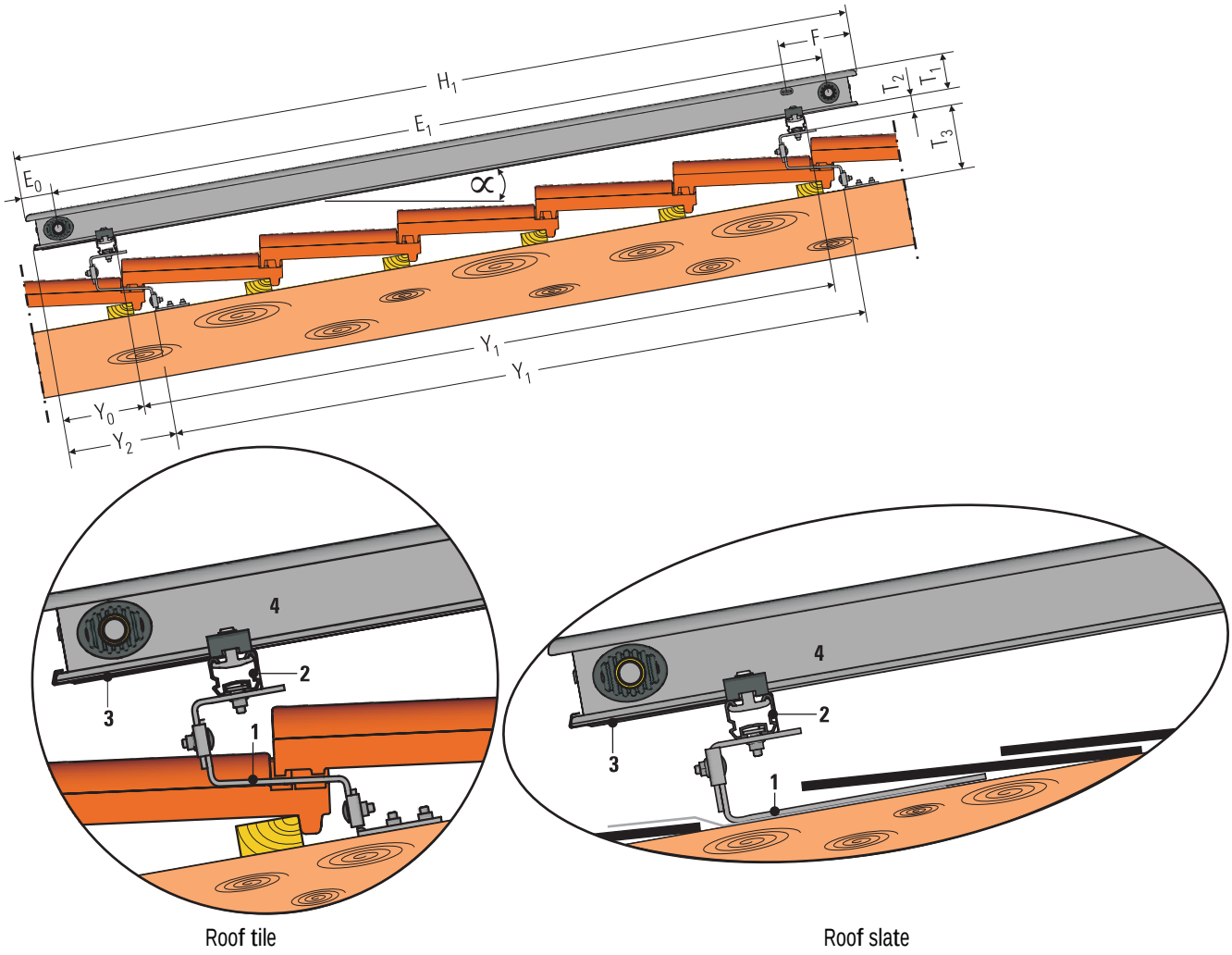


Fig. 3-4 Side view of a solar panel installed on the roof

α *Inclination angle (permissible from 15° to 80°)*

T1 Solar panel height = 85 mm

T2 Height of mounting profile rail =37 mm

T3 Height adjustment range of the on-roof securing tie:

EKSFIXAD: 141 to 178 mm
EKSFIXADP: 131 to 173 mm
EKSFIXADS: 78 to 108 mm

Installing the roof brackets and mounting rails

A defined roof area is required per flat solar panel.
- for the V26P: 2.0 x 1.33 m^2,
- and for the H26P: 1.30 x 2.03 m^2,

The main dimensions of the solar panel array (as shown in Fig 3-3 and Fig 3-4) are summarised in Tab. 3-3.

Required tool:

- 13 mm hex socket and socket wrench
- Hex socket wrench SW 5.0
- 13 mm open-ended spanner
- Hammer
- Cut-off grinder with diamond cutting wheel
- Spirit level
- Meter ruler
- Cordless drill with 6 mm bit

1. Measure the solar panel array and mark the installation site.
2. Remove the row of tiles above the intended lower edge of the flat solar panels.
3. Position the mounting rail horizontally centred on the rafters (for the entire width of the solar panel array). If several mounting rails are required for an array, they must first be joined using the mounting rail connector from the ADSFIXVBP kit and the pre-mounted studs.

4. Determine the installation points for the on-roof mounting ties. The on-roof mounting ties should be distributed evenly under the mounting profile rail (Fig 3-5 and Fig 3-6).

WARNING!

Insufficiently dimensioned supporting structures can endanger persons, the building, and the solar installation.

- Also **note the dimensions** X_0, X_1, and X_2 given in Tab. 3-3 for the rafter spacing – if necessary, a suitable supporting structure will have to be provided.
- Check the load bearing capacity of the supporting structure. Do not use roofing battens.

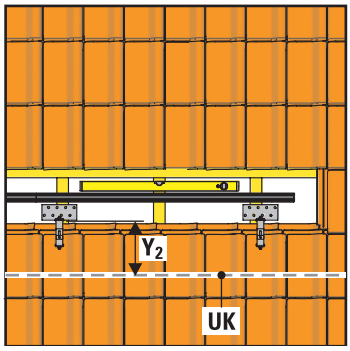


Fig. 3-5 Aligning the on-roof ties from the planned lower edge of the solar panels at distance Y_2

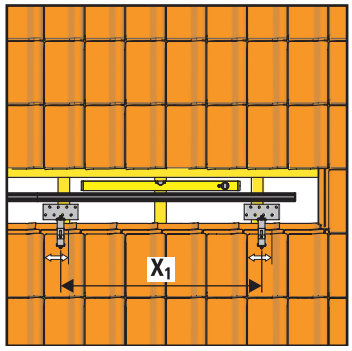


Fig. 3-6 Determining the mounting positions of the roof brackets

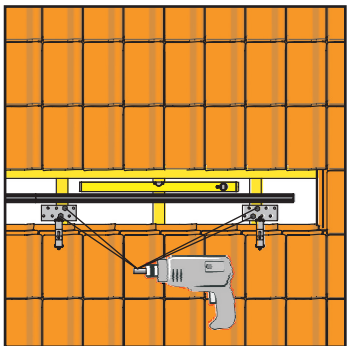


Fig. 3-7 Attach the roof brackets to the rafters with at least two screws

5. Position the perforated plate of the roof mounting bracket so that at least two screw holes are located over the rafter.

6. Place the mounting rail on the perforated plates, and align the mounting brackets parallel to the roof tiles or roof slates.

7. Roof tile:

– Fix each on-roof tie (EKSFIXAD, EKSFIXADP) to the rafters with at least two of the woodscrews provided (Fig 3-7), using a Ø 6 mm drill to produce a pilot hole.

Roof slate:

– Prepare a covering plate Fig 3-4 (taking care with adequate dimensioning).
– Fix the covering plate and on-roof ties (EKSFIXADS) to the rafters with screws.
– The heads of the screws should be sealed with a suitable silicon compound to prevent the ingress of water.

The mounting brackets may neither press on the roof tiles below, nor raise the roof tiles above.

8. If several mounting rails are being used:

- Release a stud on the assembly profile connector (do not remove) and separate the assembly profile rails again.

9. Push the individual mounting rails into the pre-assembled slide blocks of the roof mounting bracket from the side.

10. If several mounting rails are being used:

- Rejoin the rails and fix together finally using the studs supplied.

11. Tighten the self-locking nuts with which the slide blocks have been attached to the roof mounting brackets. Take care to align the mounting rail parallel to the edges of the roof tiles (Fig 3-8 to Fig 3-9).

12. Adjust the height of the mounting profile rail (Fig 3-10 to Fig 3-11).

- **With connections on both sides** (always recommended), align the mounting profile rail with a slight gradient to the return flow connection (water feed to the lower solar panel connection). A negative gradient should be avoided at all costs.
- **With same-side connection** (up to 3 solar panels) the mounting profile rail must be aligned exactly horizontally. However, we recommend always placing the connection on opposite sides (ensures automatic venting of the solar panel or draining of the solar panels in the event of a pump standstill).

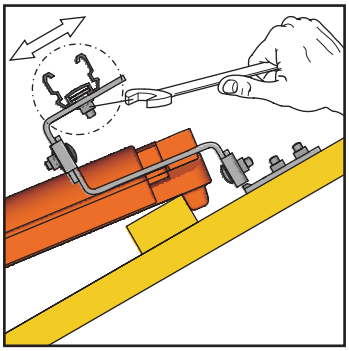


Fig. 3-8 Securely screw the profiles on the on-roof tie top section

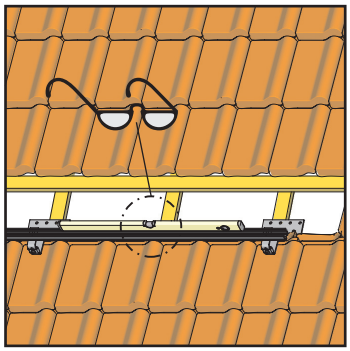


Fig. 3-9 Align the profiles parallel to the roof tile edge

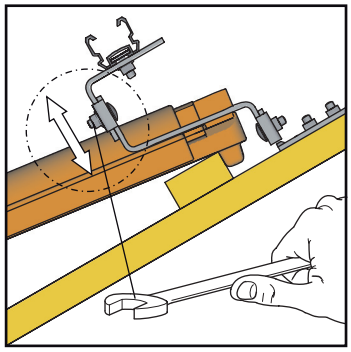


Fig. 3-10 Height adjustment of the mounting bracket

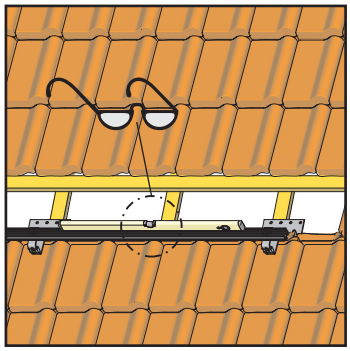


Fig. 3-11 After connection, align the profiles horizontally or with a slight gradient

13. Replace the row of roof tiles.

14. Mark the transition points of the roof ties on the roof tiles (Fig 3-12).

15. Knock out the lower tile webs at the marked transition points for the mounting brackets, or remove them with the tile cutter (Fig 3-13).

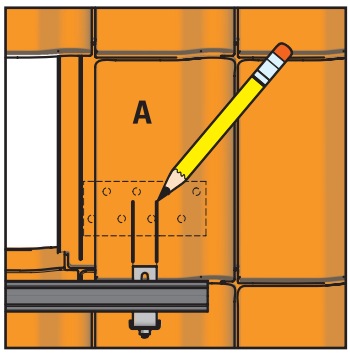


Fig. 3-12 Mark the position of the on-roof tie

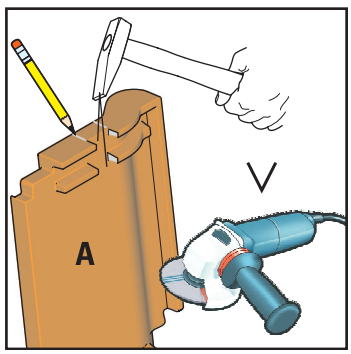


Fig. 3-13 Mark the transition points of the roof ties on the roof tiles and remove the tile webs

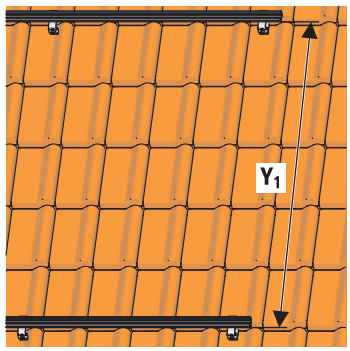


Fig. 3-14 Mounting the upper rails (see Tab. 3-3 for dimension)

16. Install the upper mounting profile rail at a distance of Y_1 from the lower mounting profile rail (Fig 3-14) (mounting sequence the same as the lower mounting profile rail). Make sure that the upper mounting profile rail forms a flat parallel area for supporting the flat solar panels in connection with the lower mounting profile rail and the height adjustment.

CAUTION!

In order to prevent torsional stresses and fixing difficulties when mounting the solar panels;
- only slightly tighten the self-locking nuts of the sliding blocks and the height adjustment in the upper mounting profile rail,
- align both mounting profile rails of the first flat solar panel exactly to each other, and then
- tighten the self-locking nuts.

3.4.2 Installing the supporting structure for subsequent installation on a flat roof

Further information is included in the operating instructions "Flat-roof mounting of solar panels". It is supplied with the basic flat roof support frame package.

3.4.3 Installing the supporting structure for subsequent in-roof installation

Further information is included in the operating instructions "In-roof mounting of solar panels". It is supplied with the basic in-roof mounting package.

3.4.4 Installing the first flat solarpanel

1. Fit solar panel securing ties vertical to the solar panel support surface, at the distance specified for the type of solar panel into the guiding groove of the lower mounting profile and tilt downwards. After they have been hooked on, the solar panel securing clips can be moved sideways (see Fig 3-15 and Fig 3-16).
2. Lift the flat solar panel onto the roof area using a crane. If no crane is available, the solar panel can be hoisted onto the roof with a rope, using a ladder leaning against the roof edge. Depending on the installation requirements, unpack the solar panel before or after the transport to the roof and remove the collection pipe protective plugs.

WARNING!

Danger of burns from hot solar panel couplings and hot solar panel frame.
- Do not touch hot parts.
- Wear protective gloves.

The flat solar panel must be lifted onto the roof in the correct orientation for mounting (prevents faults during connection or difficult manoeuvring operations). The top side of the solar panel is marked on the protective cover of the solar panel glazing. The plugs for the solar panel temperature sensor and the round solar panel connection seals must at the top when aligning the flat solar panel.

3. Position the flat solar panel above the mounting rails as shown in Fig 3-17, and carefully lower it into the securing hooks.

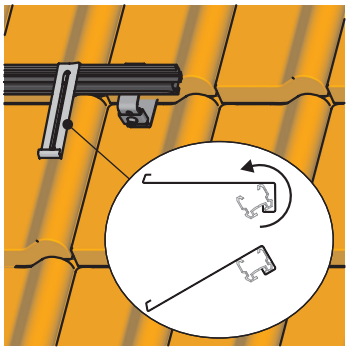


Fig. 3-15 Inserting the solar panel securing clips

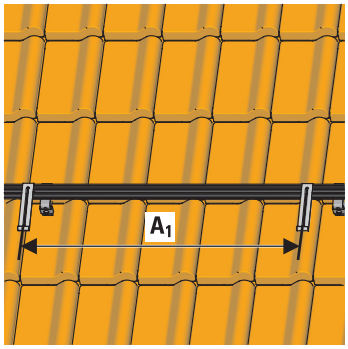


Fig. 3-16 Positioning the solar panel securing clips

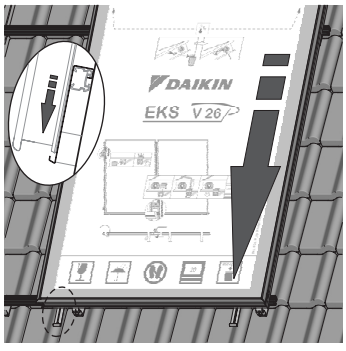


Fig. 3-17 Lowering and aligning the flat solar panel

4. Move the flat solar panel sideways until the left-hand outer ends of the two mounting rails project approx. 25 mm beyond the solar panel's edge (Fig 3-18).
   Slide the individual clamping block sideways into the mounting profile rail (flush to the end) and screw down tightly using an Allen key (Fig 3-18).

5. Push the single clip equipotential bonding terminal at the return flow connection into the mounting profile and tighten using an Allen key (Fig 3-19).
6. Slide the individual clamping block onto the mounting rail and tighten using an Allen key.

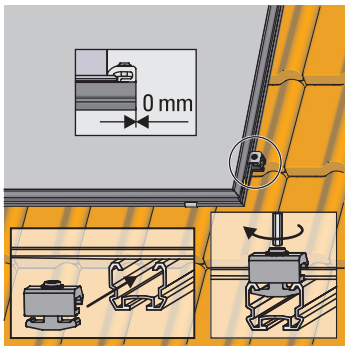


Fig. 3-18 Check correct mounting position, slide the individual clamping block into the mounting profile and screw down tightly

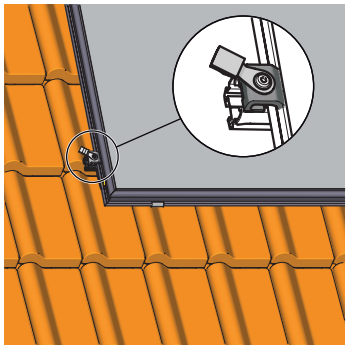


Fig. 3-19 Slide the individual clamping block with equipotential bonding terminal in and screw down tightly

3.4.5 Installing the other flat solar panels

1. Insert the double clamping blocks in the upper and lower mounting profile rail, push down with the Allen key placed on the bolt and turn it clockwise by approx. 45° (so that the bottom clamping profile moves to the clamping position) (Fig 3-20).
2. Check the position of the bottom clamping profile (Fig 3-21).
3. Slide the double clamping blocks onto the last mounted flat solar panel until the clamping profile clicks into place into the solar panel profile (Fig 3-22).

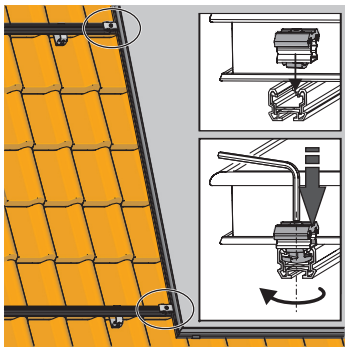


Fig. 3-20 Inserting double clamping block

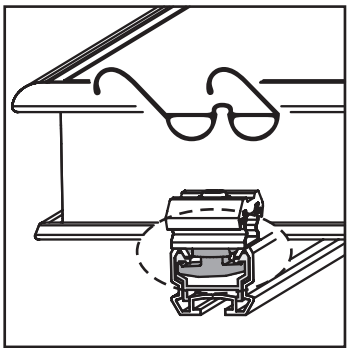


Fig. 3-21 Check the position of the bottom clamping profile .

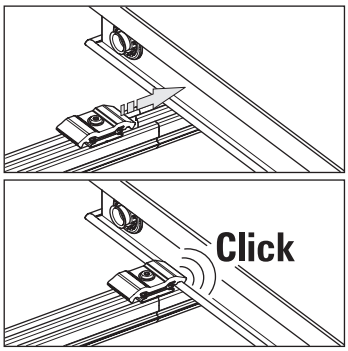


Fig. 3-22 Positioning of the double clamping block

CAUTION!

Careless handling can damage the components, resulting in difficulties during installation.

- Never crush or squash the expansion joints on the solar panel connections.
- Check connection pipes of the flat solar panels for burrs and de-burr if necessary.

4. Apply lubricant to the O-rings of the expansion joints (Fig 3-23).
5. Insert the expansion joints in the connection pipes of the last mounted solar panel until the retaining clamps click in place (Fig 3-24).
6. Lift the next flat solar panel onto the mounting rails (see Section 3.4.4, step 2), and lower into the securing clips at a distance from the expansion joints (Fig 3-25).

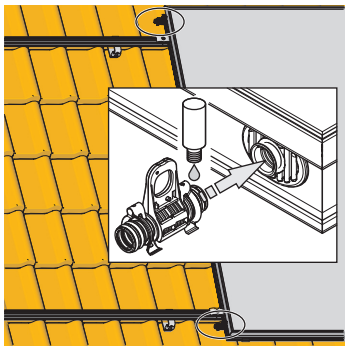


Fig. 3-23 Inserting the expansion joint

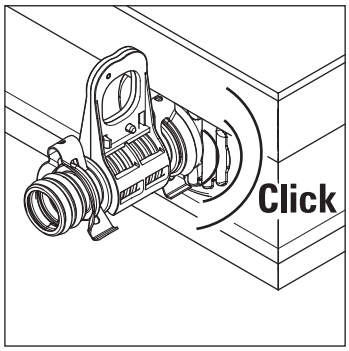


Fig. 3-24 Clicking the expansion joint in position

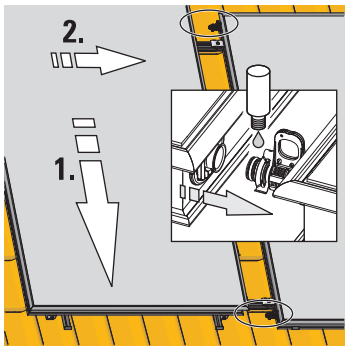


Fig. 3-25 Positioning the next flat solar panel

7. Carefully slide the next flat solar panel up to the last mounted flat solar panel. Make sure that the expansion joints slide cleanly into the connection pipes of the flat solar panel.

8. Slide the next flat solar panel further up to the stop against the last mounted flat solar panel (Fig 3-26). You should be able to hear the retaining clamps click in place. The distance between the flat solar panels is determined automatically by the length of the expansion joints with mounting supports fitted.

CAUTION!

If the retaining brackets do not click in place audibly, the solar system can develop leaks and thus restrict operational safety.

Reasons for the retaining clamps not engaging:
– Flat solar panels not completely pushed up together.
– Absorber position moved (push the absorber into the connections on the opposite side in the correct position, wearing protective gloves).

CAUTION!

If the connections on the flat solarpanel (EKSFIXVBP) are not fitted with extreme caution, the seal ring can get damaged. This causes leaks in the system.
- Always fit the expansion joints to the flat solar panels with extreme caution.
- Bring the next flat solar panel in alignment with the connection pipes of the previous flat solar panel when pushing together.

9. Tighten down the double clamping blocks (Fig 3-27).

10. Pull off the assembly supports (Fig 3-27).

11. Insert the individual clamping blocks for the last flat solar panel and tighten down (Fig 3-28).

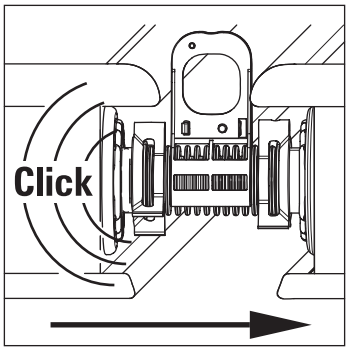


Fig. 3-26 Sliding the flat solar panels together

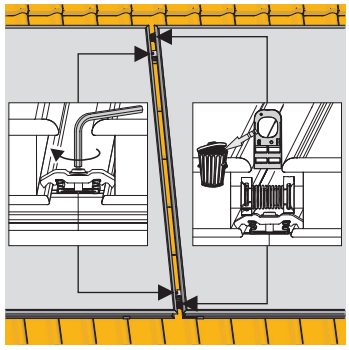


Fig. 3-27 Pulling off the assembly supports .

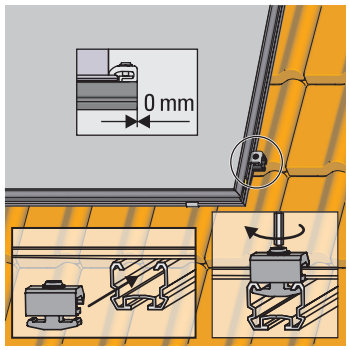


Fig. 3-28 Insert the individual clamping blocks for the last flat solar panel and tighten down .

3.4.6 Hydraulic connection of the flat solar panel (unpressurized system) p=0

CAUTION!

Thermal expansion of the plastic pipes in the connection pipe over extended horizontal sections with only a slight gradient can lead to the formation of pools of water.

Pools of water between the fixing points prevent draining of the system. This means frost safety is no longer ensured.

- The pipes should either be fixed to a rigid auxiliary structure (e.g. a profile rail, pipe etc.,) of the pipe should be run alongside a drainage pipe having a gradient (e.g. HT pipe).

CAUTION!

Siphon action may never be allowed to occur anywhere in the pipe run between storage cylinder and the flat solar panel. This could lead to functional faults and even material damage.

- Always make sure that pipe runs have a continuous gradient of at least 2 %.

If the connecting pipe of EKSCON15 or EKSCON20 is not long enough to bridge the distance between the storage cylinder and the solar panel array, it can be lengthened depending on the size of the solar panel array.

Extension kits EKSCONX25 (2.5 m), EKSCONX50 (5 m) and EKSCONX100 (10 m) are available.

Take account of the instructions concerning lengths of pipe in Tab. 3-2, Page 11.

Instructions on pipe installation

1. Run the connecting pipe with a continuous gradient between the flat solar panels and the storage cylinder.
2. Connect the solar panel array at opposite ends and set it up so that the return flow coupling (at the bottom) is located at the lowest point of the solar panel array (installation layouts Chapter 3.2Page 10).

The different connection points and dimensions of the inflow connection pipe (at the top of the solar panel Ø 15 mm) and the return flow connection pipe (at the bottom of the solar panel Ø 18 mm) make it impossible to confuse one pipe with the other.

- However, you must ensure that the inflow and return flow pipes on the flat solar panel are labelled as heat generators.

3. Remove three roof tiles at each intended roof penetration point (one or two tile rows below the solar panel connection pipes).
4. Lay the connection pipes up to the roof penetration and fix in position (e.g. with clamps).
5. Carefully open the thermal roof insulation under the penetration point, so that the return flow pipe (Ø 18 mm) can be pulled out and can be laid with sufficient gradient to the roof penetration.

CAUTION!

Leaking vapour barriers can lead to building damage.

- Reseal the vapour barrier from the inside at the penetration points of the connecting pipes and cable.

CAUTION!

If plastic pipes are damaged, there is a risk that they will break.

- When cutting through the thermal insulation, never damage the outer surface of the VA Solar pipes.

6. Run the connecting pipes through the roof at the points provided. To ensure uninterrupted thermal insulation (also within the roof structure), the insulation must be resealed at the penetration points (e.g. with adhesive tape).
7. Remove the thermal insulating hoses of the connecting pipes so that the pipes can be passed through the individual roof penetrations (Fig 3-29).

8. Pull the inflow pipe (at the top of the solar panel Ø 15 mm) and the return flow pipe (at the bottom of the solar panel Ø 18 mm) through the M32 screw connection of the respective roof penetration point. Next, push the equipotential bonding cable and the solar panel temperature sensor cable through the respective M 16 glands from inside (Fig 3-30).

9. Cover the roof penetrations (Fig 3-31).

– The roof tiles at the side and above must overlap the roof penetration.
– The corrugated flashing must overlap the roof tile underneath and be shaped to match the roof tile.

CAUTION!

With special roof coverings, such as roof tiles with very pronounced undulations (large differences in height), sealing problems can occur with the universal roof penetration box.

- In such cases, and also with plane tiles or slate roofing, a professional roofer should be consulted.

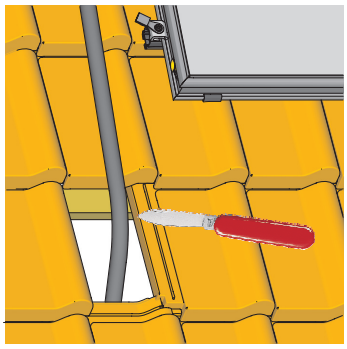


Fig. 3-29 Work step 7

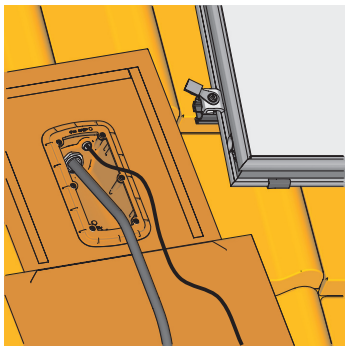


Fig. 3-30 Work step 8

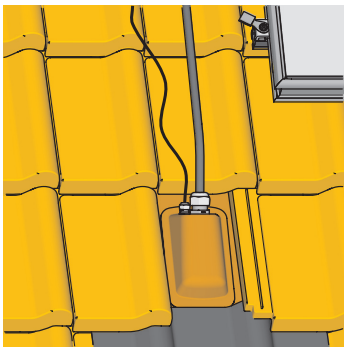


Fig. 3-31 Work step 9

10. Tighten the ring nuts of the glands for the pipes and cables (see Fig 3-32).

11. Bend the connecting pipes as necessary, mark the required length (Fig 3-33), and cut off (Fig 3-34).

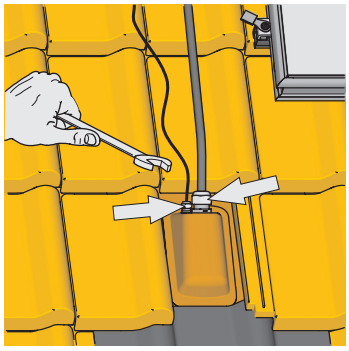


Fig. 3-32 Work step 10

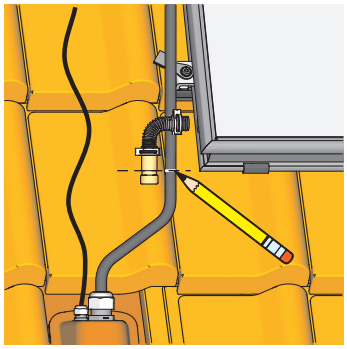


Fig. 3-33 Work step 11- marking out

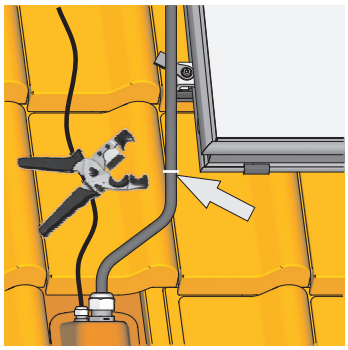


Fig. 3-34 Work step 11- cutting off

12. De-burr the ends of the pipes (O-ring protection in push fitting).

13. Cut the enclosed UV resistant heat insulation pipes to the required length (Fig 3-35).

14. Slide the heat insulation tubes over the solar pipe and clinch (Fig 3-36).

15. Push the plug fittings of the solar panel connection elbows onto feed (at the top of the solar panel Ø 15 mm) or return flow connection pipe (at the bottom on the solar panel Ø 18 mm) respectively (Fig 3-37).

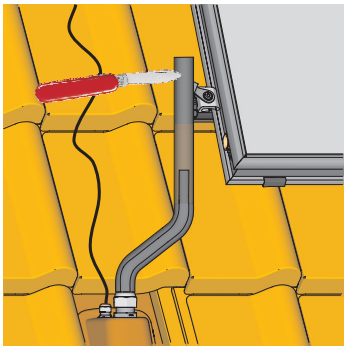


Fig. 3-35 Work step 13

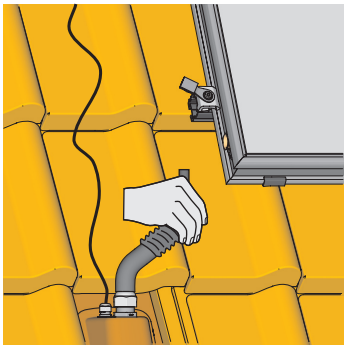


Fig. 3-36 Work step 14

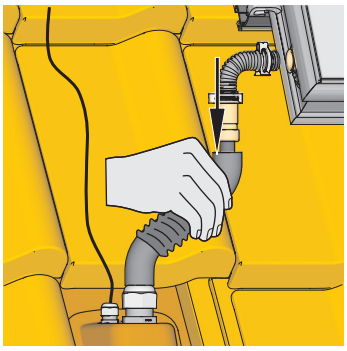


Fig. 3-37 Insert push fittings solar panel connection elbows

16. Apply lubricant to the O-rings of the solar panel connection elbows . Insert solar panel connection elbows into the solar panel connection pipes until the retaining clamps click in place (Fig 3-38).

17. Slide the clinched thermal insulation hose over the fitting (Fig 3-39).

18. Apply lubricant to the O-rings of the end plugs. Insert the end plugs into the open solar panel connection pipes until the retaining clamps click in place. (Fig 3-40).

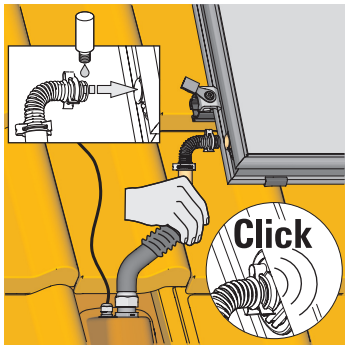


Fig. 3-38 Work step 16

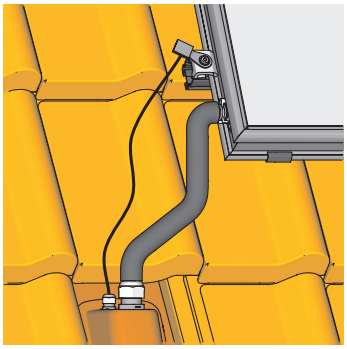


Fig. 3-39 Work step 17

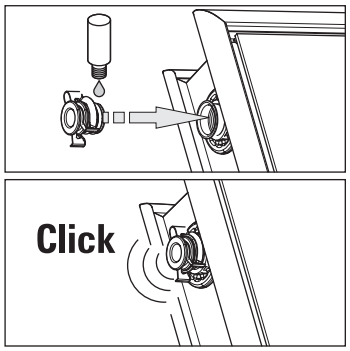


Fig. 3-40 Work step 18

3.4.7 Hydraulic connection of a flat solar panel (pressurized system)

WARNING!

Danger of burns from hot solar panel couplings and hot solar panel frame.

- Do not remove the cover of the solar panel until hydraulic connection work has been completed.
- Do not touch hot parts.
- Wear protective gloves.

CAUTION!

Danger of being scalded if you use the wrong connection pipes.

- The connection pipe between the solar panel array and the hot water storage tank must be made of pressure-resistant metal piping (recommended Cu Ø 22 mm).
- Using plastic piping is not allowed.

The connection fittings included in the connection kit EKSRCP have compression ring joints for copper piping Ø 22 mm. Therefore we recommend also using copper piping with a Ø 22 mm as the connection pipe between the solar panel array and the hot water storage tank.

Commercially available ventilation tiles for roofing are suitable for the connection pipes penetrating the roof.

Instructions on pipe installation

1. Lay connection pipes between the flat solar panels and the location of the hot water storage tank.
   – Connect the solar panel array at opposite ends and set it up so that the return flow coupling at the bottom is located at the lowest point of the solar panel array (installation layouts Chapter 3.2 Page 10). The feed pipe should preferentially be connected at the opposite end at the top of the solar panel.
   – Don't forget to thermally insulate the connection pipes indoors.
2. Install connection fittings (Fig 3-41).
3. Outdoors cover the connection pipes with UV resistant thermal insulation tubing.
4. Apply lubricant to the O-rings of the end plugs. Insert end plugs into the open solar panel connection pipes until the retaining clamps click in place (Fig 3-42).

CAUTION!

Leaking vapour barriers can lead to building damage.
- Reseal the vapour barrier from the inside at the penetration points of the connecting pipes and cable.

5. Connect the connection pipes (Cu Ø 22 mm) to the compression joints of the connection fittings (Fig 3-43).

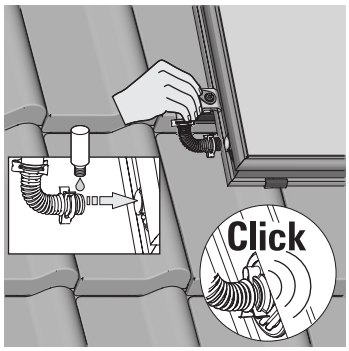


Fig. 3-41 Work step 2

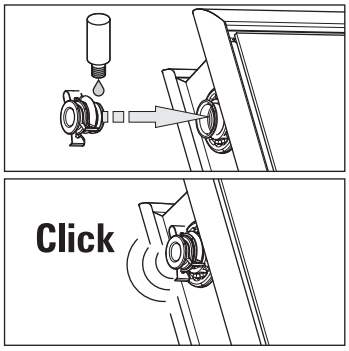


Fig. 3-42 Work step 4

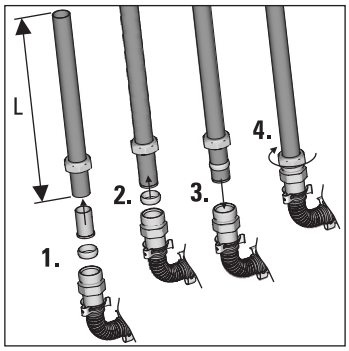


Fig. 3-43 Work step 5

3.4.8 Installing the equipotential bonding

WARNING!

The equipotential bonding terminal is not a substitute for a lightning rod. It is merely intended to protect the solar panel temperature sensor. Local lightning strike regulations must be observed.

1. Release the slotted screws on the equipotential bonding terminal (Fig 3-44).
2. Connect the equipotential bonding cable (not included in delivery).
3. Tighten the screws of the equipotential bonding terminal Fig 3-45).

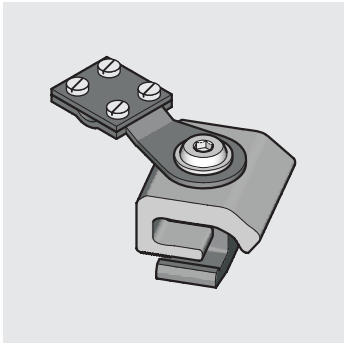


Fig. 3-44 Clamping plate with equipotential bonding terminal

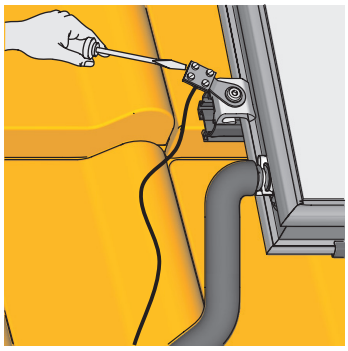


Fig. 3-45 Connecting equipotential bonding cable

4. Lay the equipotential bonding cable to the equipotential bonding rail, fix with cable ties and connect to the equipotential bus bar.

If two or more solar panel rows are installed, they must be connected using an equipotential bus bar. Equipotential terminals are:

– p=0 included in the EKSCONRVP kit and

– +p in the EKSCONLCP kit.

3.4.9 Installing the solar panel temperature sensor

CAUTION!

Connection pipes will not dissipate voltages induced by electrical storms. Under adverse circumstances, these voltages can extend through the solar panel sensor up to the control and thus damage both.

- Generate equipotential bonding ("Earthing") between foundation and solar panel array.

This should only be performed by an authorised specialist (electrician) in accordance with the local regulations.

The mounting openings for the solar panel temperature sensor are located to the left and right at the top of the side solar panel frame, approx. 10 cm below the upper connection. The mounting openings are fitted with plugs in the as-delivered condition. Fit the solar panel temperature sensor at the position where the feed pipe is connected.

1. Remove the sensor plugs (Fig 3-46).
2. Push solar panel temperature sensor up to the stop in the flat solar panel (Fig 3-47). The sensor must be clamped to the absorber plate.
3. Run the silicone-covered sensor cable to the roof penetration box (with drip-off elbow), and secure it to the mounting rail or connecting pipe by means of cable ties (Fig 3-48).

CAUTION!

Moisture can damage the temperature sensor.

- When securing the cable, make sure that no rainwater can run down the cable to the sensor.

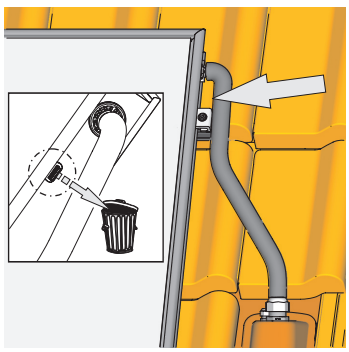


Fig. 3-46 Work step 1

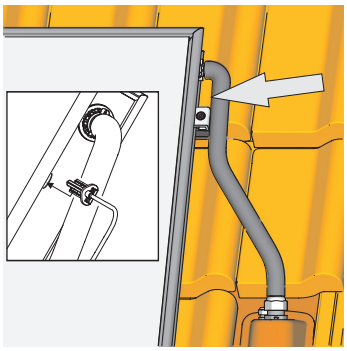


Fig. 3-47 Work step 2

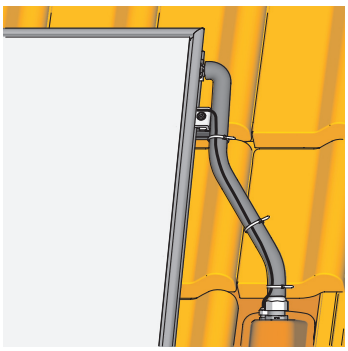


Fig. 3-48 Work step 3

4. Inside the roof, connect the silicon cable of the solar panel temperature sensor to the feed cable of the solar panel temperature sensor from the pump unit (p=0 EKSRPS3 or +p EKSR3PA)

3.4.10 Removing the flat solar panel

WARNING!

Live parts can cause an electric shock on contact and cause life-threatening burns and injuries.
- Before beginning removal work on live parts or the solar control system, disconnect them from the power supply (switch off fuse, main switch) and secure against unintentional restart.
- Comply with the relevant safety at work regulations.

WARNING!

Danger of burns from hot solar panel couplings and hot solar panel frame.
- Do not touch hot parts.
- Wear protective gloves.

Solar panel dismantling is carried out basically in the reverse sequence to the solar panel assembly.

If the flat solar panels are to be separated, the connection elbows or expansion joints must first be released as follows:

1. Press the retaining clamps out of the engagement positions and pull off (Fig 3-49 and Fig 3-50).
2. Pull off the connection elbows (Fig 3-50).

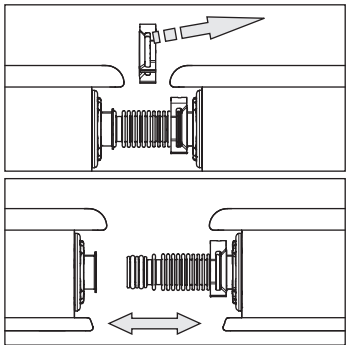


Fig. 3-49 Work step 1

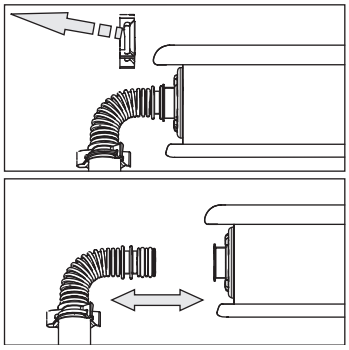


Fig. 3-50 Work step 2

4.1 Start-up

The instructions for integrating the hydraulic system, start-up, operating the control systems and rectifying faults and malfunctions are contained in the operating and installation instructions of the control system and pump unit (p=0 EKSRPS3 or +p EKSR3PA + EKSRDS1A).

4.2 Taking out of service

4.2.1 Temporary shutdown

CAUTION!

A heating system which is shut down can freeze in the event of frost and may suffer damage.

- Drain the heating system that is shut down if there is danger of frost.

If solar heating support is not required for water heating for an extended period, the solar system can be switched off temporarily at the mains switch of the solar control system.

If there is a danger of frost:

– the solar system must be started up again
or
– suitable antifreeze measures must be applied to the connected heating system and hot water storage tank (e.g. draining).

If there is a danger of frost for just a few days, the unit's excellent heat insulation means that the water storage tank does not have to be drained, provided that the storage tank temperature is monitored regularly and does not fall below +3°C. This does not, however, provide any protection against frost for the connected heat distribution system!

Draining the storage tank

- Switch off the main switch and secure against restarting.
- p=0:
  – Connect a hose to the solar return flow with the boiler filling and draining valve using the hose connection.
  – Drain the tank's water content.
- +p:
  – Follow the instructions on shutdown provided in the operating and installation instructions EKSR3PA + EKSRDS1A.

Recommendations for disposal

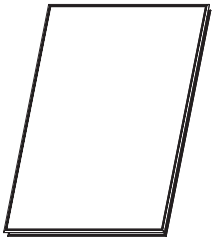
The DAIKIN solar system is constructed in an environmentally friendly way. During the disposal process, the only waste produced is that which can be used for material or thermal recycling.

The materials that are suitable for recycling can be separated so that they are unmixed.

Through the environmentally friendly design of the solar system, DAIKIN has complied with requirements for environmentally sound disposal. Proper disposal in compliance with the applicable national regulations of the country of use is the responsibility of the user/owner.

5 Technical data

5.1 Basic data

High-performance flat solar panel	EKSV26P	EKSH26P
Basic data		
Dimensions L x W x H	2000 x 1300 x 85 cm	1300 x 2000 x 85 cm
Gross surface area	2.60 m2	2.60 m2
Aperture surface area	2.35 m2	2.35 m2
Absorber surface area	2.36 m^2	2.36 m^2
Absorber	Harp-shaped copper tube register with welded-on highly selective coated aluminium sheet.	
Coating	MIRO-THERM (absorption max. 96 %, emission approx. 5 %± 2 %)	
Glazing	Single pane safety glass, Transmission approx. 92 %	
Heat insulation	Rock wool (50 mm)	
Weight	42 kg	42 kg
Water content	1.7 l	2.1 l
Max. pressure drop at 100 l/h	3.0 mbar.	0.5 mbar.
Possible inclination angle on-roof	15° to 80°	
Max. standstill temperature	approx. 200 °C	
Max. operating pressure	6 bar	
The solar panel is permanently standstill proof and thermo-shock tested. Minimum solar panel yield above 525 kWh/m^2 per year with 40 % cloud coverage (location Würzburg)		

Tab. 5-1 Technical Data Flat Solar Panel

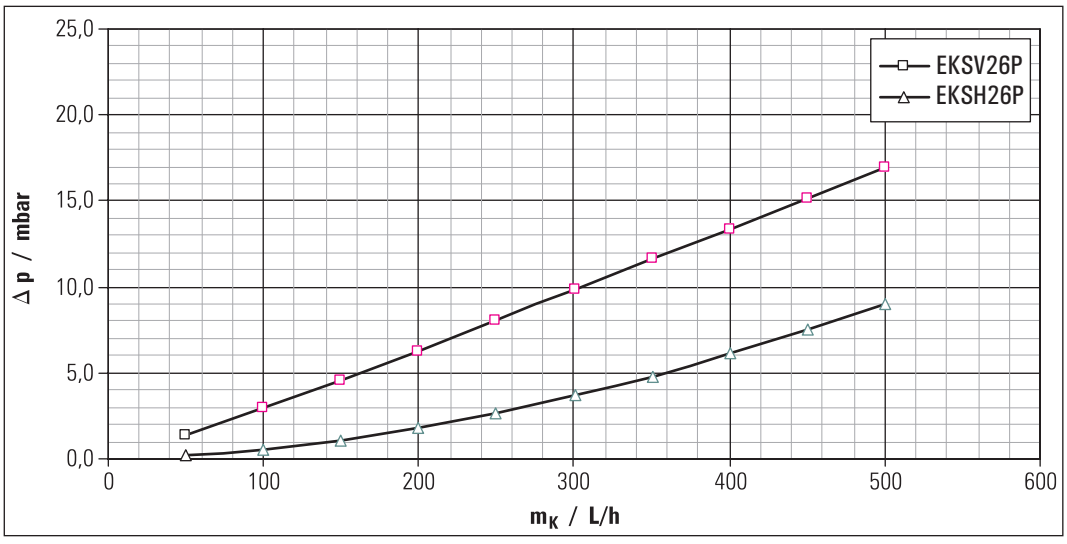


Fig. 5-1 Hydraulic resistance flat solar panels

5.2 Wind zones

5.2.1 Subdivision into areas

Wind zone	Area	Wind speed at		
		Building height 10 m	Building height 18 m	Building height 15 m
1	Inland	102 km/h	116 km/h	125 km/h
2	Inland	116 km/h	129 km/h	137 km/h
	Coast	133 km/h	144 km/h	15 km/h
3	Inland	129 km/h	140 km/h	151 km/h
	Coast	148 km/h	158 km/h	164 km/h
4	Inland	140 km/h	154 km/h	164 km/h
	Coast	161 km/h	170 km/h	179 km/h

Tab. 5-2 Wind zone sub-division

5.2.2 Maximum permissible building heights

Location	Wind zone 1 and 2	Wind zone 3		Wind zone 4	
	Maximum permissible building heights for flat solar panel installation				
Inland	25 m	25 m	25 m	18 m	25 m
Coast	25 m	10 m	25 m	—	10 m
Min. number of roof ties per flat solar panel	4	4	6	4	6

Tab. 5-3 Max. permissible building heights for flat solar panels for on-roof installation

5.3 Snow load zones

Snow load	Snow load zone	Maximum permissible altitude for flat solar panel installation	
< 0.65 kN/m²	1	448 m	507 m
	1a	400 m	418 m
< 0.85 kN/m²	2	not permissible	286 m
	2a	not permissible	
< 1.10 kN/m²	3	not permissible	
Min. number of roof ties per flat solar panel		4	6

Tab. 5-4 Max. permissible snow loads for flat solar panels for on-roof installation

6 List of keywords

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4PW56021-1